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SPECIFICATION FOR THE PROBLEM DATA SYSTEM  
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FUNCTIONAL DESIGN SPECIFICATION  
FOR THE  
PROBLEM DATA SYSTEM

Job Order 88-099

NASA CR-

144358

Prepared By  
Lockheed Electronics Company, Inc.  
Aerospace Systems Division  
Houston, Texas  
Contract NAS 9-12200

For  
INSTITUTIONAL DATA SYSTEMS DIVISION



*National Aeronautics and Space Administration*  
**LYNDON B. JOHNSON SPACE CENTER**  
*Houston, Texas*


June 1975

LEC-6329

FUNCTIONAL DESIGN SPECIFICATION  
FOR THE  
PROBLEM DATA SYSTEM (PDS)


Job Order 88-099


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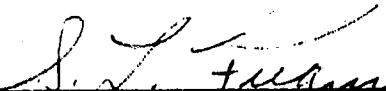
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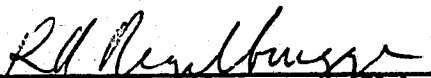
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## FOREWORD

The purpose of the Functional Design Specification (FDS) is to outline the design for the Problem Data System. The Problem Data System is a computer-based data management system designed to track the status of problems and corrective actions pertinent to Shuttle hardware.

This FDS is an extension of the Detail Requirements Document and as a result is not intended as a stand-alone document.

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## GLOSSARY

- CFE** Contractor Furnished Equipment  
Equipment which is provided to NASA by a prime contractor.
- DRD** Detailed Requirements Document
- FDS** Functional Design Specifications
- GFE** Government Furnished Equipment  
Equipment which is procured or manufactured by JSC or other NASA centers.
- IPDS** Interim Problem Data System
- JSC** Lyndon B. Johnson Space Center
- LEC** Lockheed Electronics Company, Inc.
- PAE** Problem Assessment Engineering  
Responsible for permanent storage and retrieval of data pertaining to problems occurring on hardware programs. PAE also defines procedures for processing of information resulting from these problems.
- PDS** Problem Reporting Data System  
A computer-based system for tracking the status of problems and corrective actions related to Shuttle hardware.

## GLOSSARY (Concluded)

- QAD**     **Quality Assurance Division**  
Responsible for management of the Problem Reporting Analysis and Corrective Action (PRACA) System, and Resolution of Manufacturing problems.
- SR&QA**   **Safety, Reliability and Quality Assurance Office**
- S2K**     **System 2000**  
General purpose data management system which provides access to one or more data bases.
- S2KMM**   **System 2000 multi-user multi-thread Executive** to allow concurrent update access to data bases.
- TLP**     **Task Link Processor**

## REFERENCES AND PERTINENT DOCUMENTS

1. Support Contractor Job Order 88-099, Amendment 4, "Problem Reporting Data System," Institutional Data Systems Division, October 1974.
2. Task Description for the Problem Reporting Data System (PDS), Amendment 4, Job Order 88-099, October 1974, LEC-0679.
3. Specification for Problem Data System, Interim, JSC Quality Assurance Division, July 1973.
4. Project Implementation Plan for the Problem Reporting Data System, Job Order 84-367, June 1974, LEC-1260.
5. Raines, M. L., Director Safety, Reliability, and Quality Assurance, Management Manual "Problem Reporting and Correction Action System for JSC Programs," JSCM 5530 Revision A, Draft, July 1974.
6. Space Shuttle Program Definition and Requirements, Volumes I, II, V, XII, NASA JSC 07700.
7. User's Guide for the Interim Problem Data System, Job Order 88-099, December 1974, LEC-5513.
8. Detailed Requirement Document for the Problem Reporting Data System (PDS), Job Order 88-099, January 1975, LEC-5549.

9. Detail Requirements Document for Shuttle Program Information Management System, Common Software, LEC- 5479, JSC-09380, Lockheed Electronics Company, February 1975.
10. Functional Design Specifications for Shuttle Program Information Management System, Common Software, LEC- 5774, JSC-09575, Lockheed Electronics Company, Inc.
11. System 2000 Reference Manual, MRI Systems Corporation, Revision B, September 30, 1974.

## 1.0 GENERAL

### 1.1 IDENTIFICATION

This Functional Design Specification (FDS) has been prepared for the Lyndon B. Johnson Space Center (JSC), Institutional Data Systems Division (IDSD), by the Shuttle Information Management Systems Department of Lockheed Electronics Company, Inc. (LEC) in response to support contractor job order 88-099, Problem Data System (reference 1) and in accordance with the Task Description for the Problem Data System (reference 2). The Problem Data System (PDS) is being developed for the Quality Assurance Division (Safety, Reliability and Quality Assurance Office).

### 1.2 PURPOSE

The PDS will provide the user organizations with an integrated management and documentation tool to support the following functions:

- Interactive tracking of Shuttle Hardware problem status and corrective action
- Online updates
- Data searches and code transformations
- Display of data in predefined reports
- Batch reports

### 1.3 BACKGROUND AND REFERENCES

Prior to the implementation of the final PDS an Interim Problem Data System (IPDS) was established. IPDS accomplished two major objectives: the storage of problem data in machine readable form for eventual transfer to PDS and the production of a weekly Open Problem List. In addition, it provides a full problem listing batch report and responds to certain online requests. IPDS was implemented in February 1975 on the CYBER computer, under the KRONOS Time Sharing Operating System (KRONOS), and utilizing SYSTEM 2000 (S2K) as the data management system software.

Additional background information is provided in the DRD for PDS.

### 1.4 DESIGN CONSTRAINTS

The Problem Data System will utilize the JSC CYBER 74 computer system. PDS will require shared usage of the following hardware:

- CYBER 74 computer
- CDC 844 disk mass storage
- Hazeltine 4000G (JSC MOPS)
- High speed line printer

The PDS resides with and operates using the following software:

- KRONOS                      CYBER operating system

- TCS                      Terminal Control System
- Common Software      SPIMS applications shared routines
- System 2000            Data Base management system

The system requires both online interaction and batch processing.

### 1.5 SYSTEM INTERFACE

The Problem Data System data base will initially be loaded from the IPDS data base currently operating on the JSC CYBER 74 computer. This interface is described in detail in section 5.1, Data Base Establishment.



## 2.0 SYSTEM DESIGN

### 2.1 SYSTEM ARCHITECTURE

The PDS is designed to operate on the JSC CYBER 70 series computer as two independent systems; the interactive processing system, and the batch processing system. In support of these two systems there will be three data bases and three permanent files (defined later in this document).

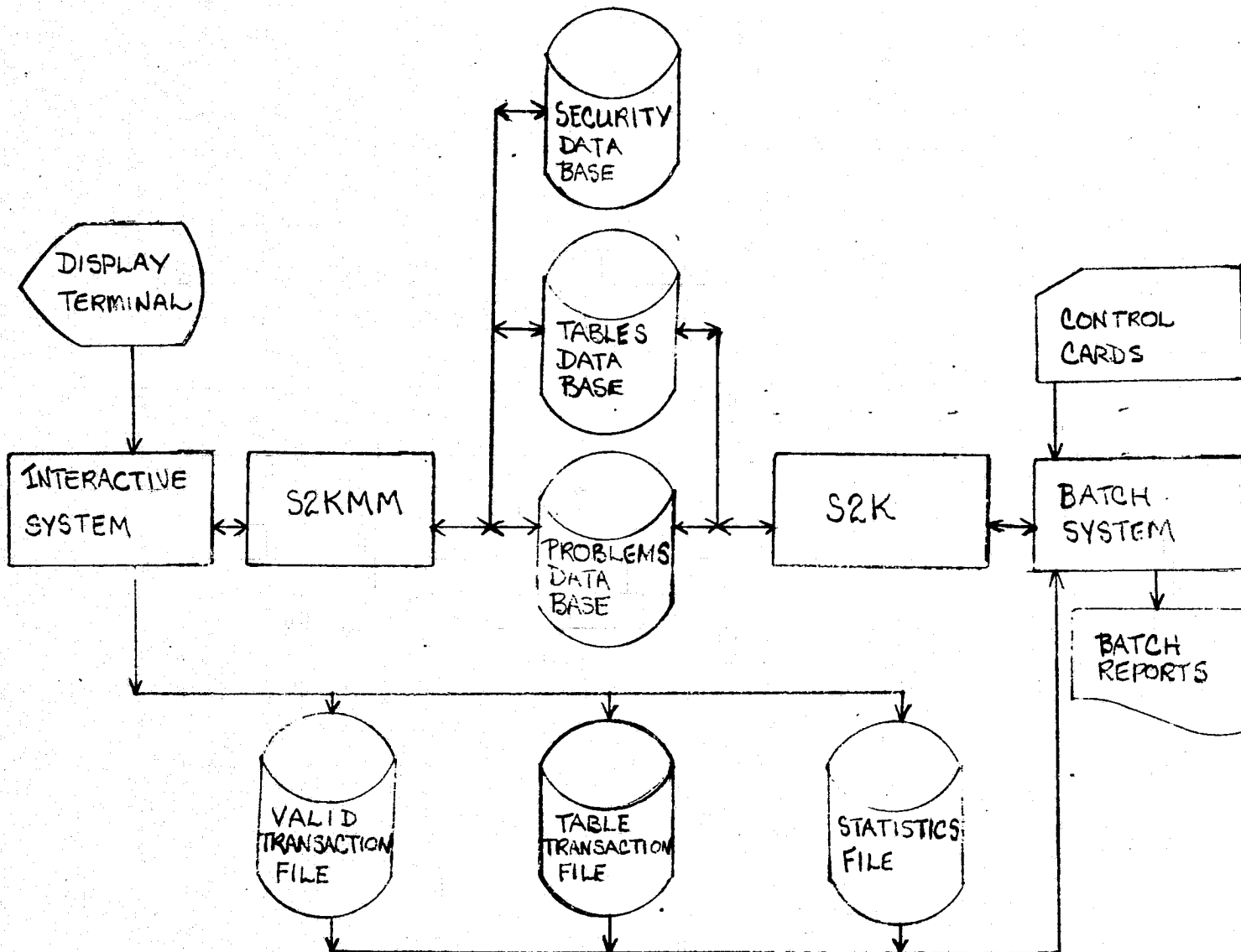
The interactive system interfaces to the user via his terminal and to the three data bases by means of S2KMM. The three permanent files are updated by the interactive system during transaction processing.

The batch system interfaces to two of the data bases by means of S2K (single-user update) and to the user by a card reader. The three permanent files are used as input for report generation.

Figure 2-1 illustrates the basic high level PDS flow.

#### 2.1.1 Design Approach

The PDS interactive system will use transaction processing techniques. A transaction is the process by which an interactive system directs a programmed function to a predetermined conclusion. A transaction includes the input message, the computer processing and the sending of output messages associated with the function. Additional terminal and mass storage I/O, under program control, may be required to fulfill the initial user request. Terminal



PDS FLOW

FIGURE 2-1

support will utilize a structured mode for input and output of data (Forms). The transaction is terminated by the final output messages for the function initiated by a users request or by user interruptions.

A transaction will be processed by the serial execution of a chain of tasks. A task is a logical subset of a transaction. The functions supported by the tasks to be provided are:

<u>Task Name</u>	<u>Unique Number of Tasks Required</u>	<u>Functional Description</u>
User Validation	1	Receives user number and password and validates request against the security data base. Establishes user access to Problem Data Base, and initiates command cracker.
User Termination	1	Closes all data bases; process valid transaction, table and statistics logging.
Command Cracker	1	Interprets function key or command and initializes first task of the requested transaction.
Input (interactive)	20	Receive from the user all selection criteria necessary to process the requested transaction. Initiates next task in the transaction.

<u>Task Name</u>	<u>Unique Number of Tasks Required</u>	<u>Functional Description</u>
Read Data Base	38	Selects proper data base and reads data required to execute transaction.
Security	15	Determines if user is allowed access to data and/or authority to execute transaction.
Write terminal (structured)	38	Initialize forms and provide data to common software routines for transmission to user terminal.
Read Terminal (structured)	15	Receive data transmission from user utilizing common software and reformatting input data as required.
Validation	13	Editing of input data utilizing code list from mass storage and common software. This task will also provide code conversion.
Write Data Base	20	Updating applicable data base.

The unique exception processing (input error, user interrupt) support required by each task will be defined in the detail design of each task. Exception processing will provide two capabilities:

- Initiation of command transaction (user interrupt)
- Initiation of error correction (input error)

The linkage of the tasks to form a transaction is accomplished by the use of the Task Link Processor (TLP) in PDS. The TLP is a program that calls the next task in a transaction's sequence. The Task Link Processor makes no decisions; however, each task is responsible for scheduling the next task through the TLP. The Task Link Processor calls the Sign-On transaction.

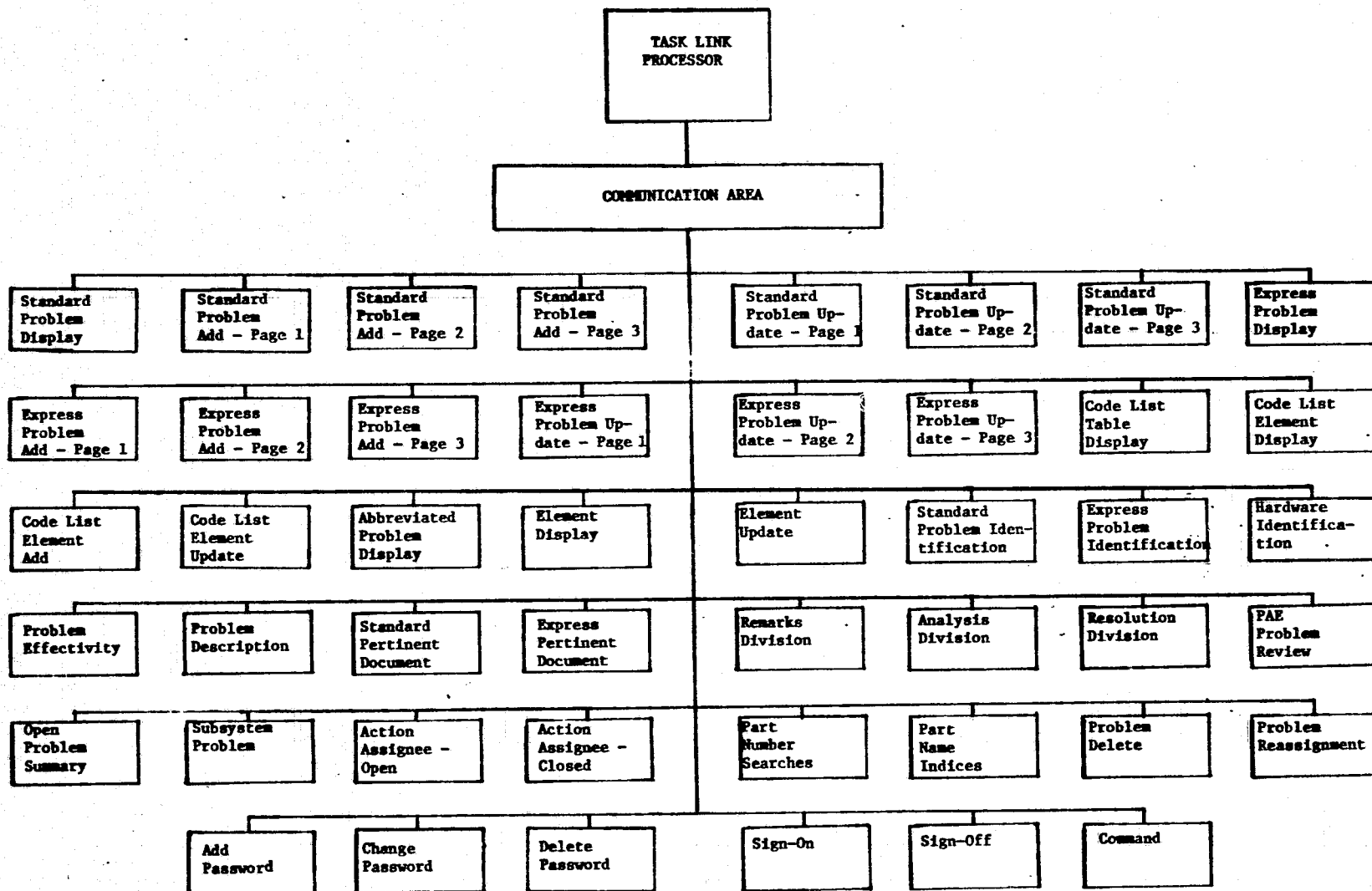
Communications between tasks is provided via a common communication area. Each element in the communication area will be defined. Data can be passed between tasks in an orderly fashion using this technique.

The transactions necessary to satisfy the requirements of the PDS DRD are illustrated in figure 2-2. Each transaction is outlined in section 3 of this document.

The PDS batch processing system is designed to operate in a multi-programming environment producing the reports that were outlined in the DRD for PDS. Figure 2-3 illustrates the high level batch processing system. Section 4 of this document outlines each of the batch programs.

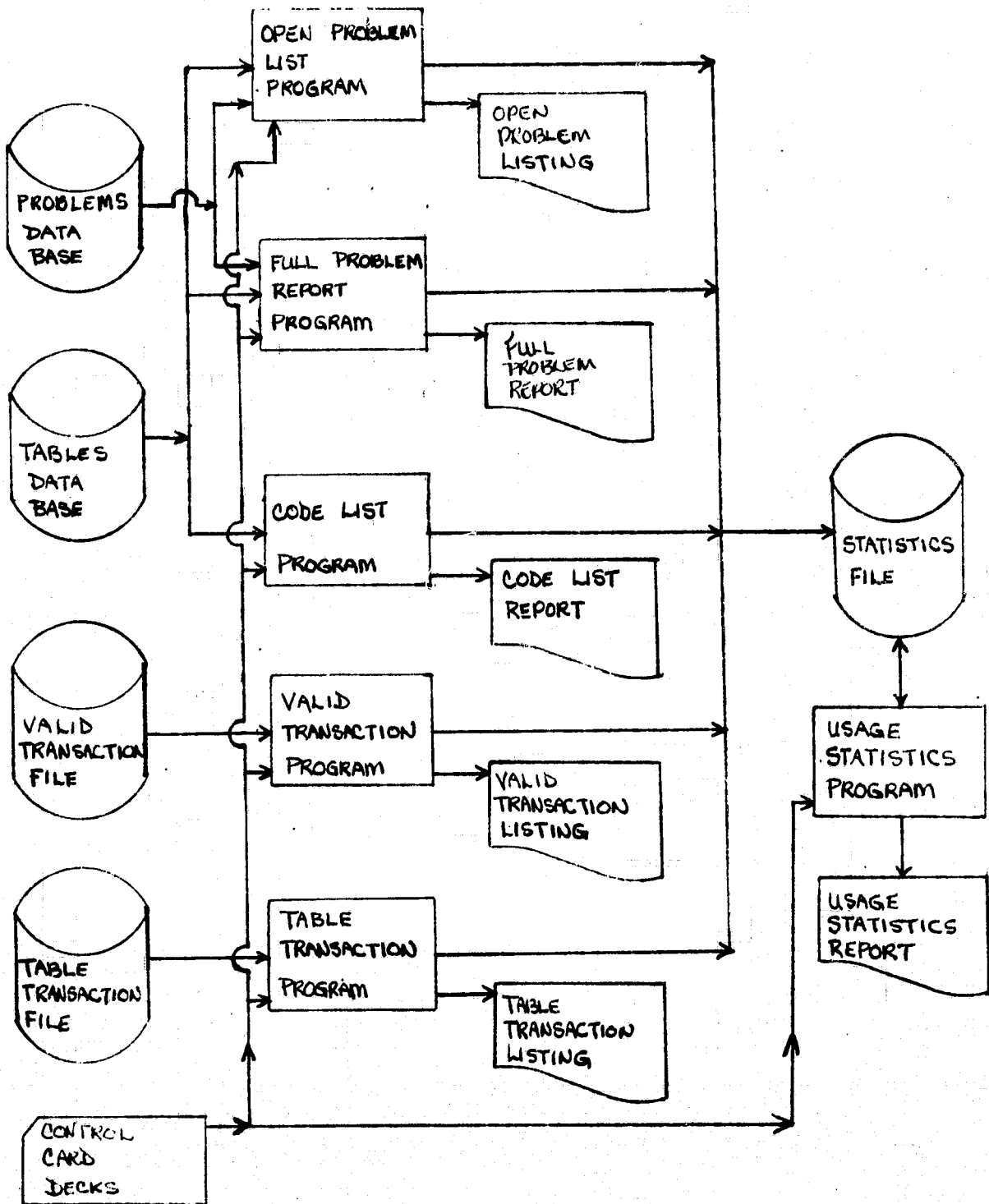
#### 2.1.2 Common Software

The SPIMS Common Software was conceived as a method for minimizing development and maintenance cost of the SPIMS applications while reducing the time-frame of their development. The PDS will make use of the SPIMS Common Software routines as described in the Common Software Detailed Requirements Document and Functional Design Specifications (reference 9 and 10).



INTERACTIVE PROCESSING SYSTEM

Figure 2-2



PDS BATCH SYSTEM FLOW

FIGURE 2-3

Since Common Software will be provided as a series of subroutines callable from PDS tasks, the user will communicate with a completely integrated package. The use of Common Software will therefore be transparent to the user.

Common software will provide the following routines.

- Terminal Interface routines
- Data Element Editing routines
- Utility routines

The Terminal Interface routines will provide the data paths and interfaces to communicate with the user terminals.

The Data Element Editing routines provided by common software will be supplemented by additional PDS routines to provide the editing required by PDS.

The utility routines provided by common software will include String Packages and File Input/Output routines. These will be used instead of standard FORTRAN in order to conserve central memory.

### 2.1.3 System 2000

System 2000 is the general purpose data base manager to be used by PDS. A detailed description of System 2000 is provided by reference 11.

System 2000 multi-user, update feature will be utilized to allow concurrent access to the data bases during



interactive processing. The single-user update version of System 2000 will be used for the batch processing.

PDS will use the Basic Natural Language feature to define the data bases. Natural Language will also be employed by the data base administrator to provide data base backup.

FORTTRAN language subroutines will utilize the Procedural Language Interface (PLI) feature to manipulate data in the System 2000 data bases. This feature will be utilized in both the interactive processing and the batch processing.

## 2.2 FILE DEFINITION

The following files will be utilized or generated by the PDS system.

- System 2000 Data Base - a set of six associated direct access files, with an associated update file. These are the standard files S2K creates when a data base is defined.
- Permanent files - created during the execution of the interactive system. These files are for valid transaction logging, table logging and statistic recording. Figure 2-4 illustrates the record format of these files.

1	30 31	40 41	50 51	60 61	66 67	72 73	98 99	118 119	130
PROJECT	DATE	TIME	USER-ID	TRANS. TYPE	REPORT NUMBER	ELEMENT TITLE	PREVIOUS VALUE	CURRENT VALUE	

### VALID TRANSACTION FILE

1	25 26	35 36	45 46	51 52	57 58	82 83	112 113	130
TABLE NAME	DATE	TIME	TRANS. TYPE	EXPRESS CODE	STANDARD ABBREVIATION	DEFINITION	OTHER INFORMATION	

### TABLE TRANSACTION FILE

1	10 11	17 18	21 22	26 27	32 33	38 39	44
USER-ID	CPU CENTI- SECONDS	SECURITY VIOLATIONS	EDITING ERRORS	QUERIES	TRANS.	PAGES PRINTED	

### USAGE STATISTICS FILE

## PERMANENT FILE RECORD FORMATS

FIGURE 2-4

## 2.3 DATA BASE DEFINITION

The PDS will consist of three unique data bases (Problem, Tables, Security). The information contained in each data base relates to the transaction/task concept of the PDS. A transaction requesting data from the Problem Data Base does not conflict with a transaction requesting data from the Tables Data Base. Not only does this speed up processing by reducing the data base queue but also reduces search time by simplifying the data base structures.

### 2.3.1 Problem Data Base

The Problem Data Base is used to maintain the problem data for PDS. It will be used by the read data base and the write data base tasks during the execution of a problem related transaction. This data base will also be used by the batch programs to produce the Open Problem List and Full Problem Report.

The Problem Data Base is a two level structure. Level 0 contains the heading and problem identification information for each entry. Standard abbreviations are stored along with express codes for some elements to reduce processing time upon display of the data. Level 1 contains the remaining information for each entry broken up into seven repeating groups. The first three repeating groups contain data which is repetitive in nature and can appear many times per entry. Location of this information in its own repeating group facilitates system retrieval time and minimizes mass storage. The last four repeating groups are text fields and are defined such that a line of text is a

data element. This implied repetitive pattern indicates repeating group structure for the same reasons given above.

Figure 2-5 illustrates the structure of the Problem Data Base.

### 2.3.2 Tables Data Base

The Tables Data Base is used to maintain the data validation tables for PDS. A Common Software program will be executed at system startup time to collect the various tables into a single random access file. PDS will utilize this file for data validation processing. Also the Tables Data Base will be used during a table change transaction.

The Tables Data Base is a two-level data base. Level 0 contains the table name and codes. Level 1 contains the entries for each table.

Figure 2-6 illustrates the structure of the Tables Data Base.

### 2.3.3 Security Data Base

The Security Data Base is used to maintain the user passwords for PDS. It will be used by the Sign-On Transaction to verify PDS users. It will also be used by the Password-dependent transactions (Add, Change, Delete).

The Security Data Base is a one-level data base. The Data Base will contain the user ID, user password, and the information to determine Problem Data Base access.

Figure 2-7 illustrates the structure of the Security Data Base.

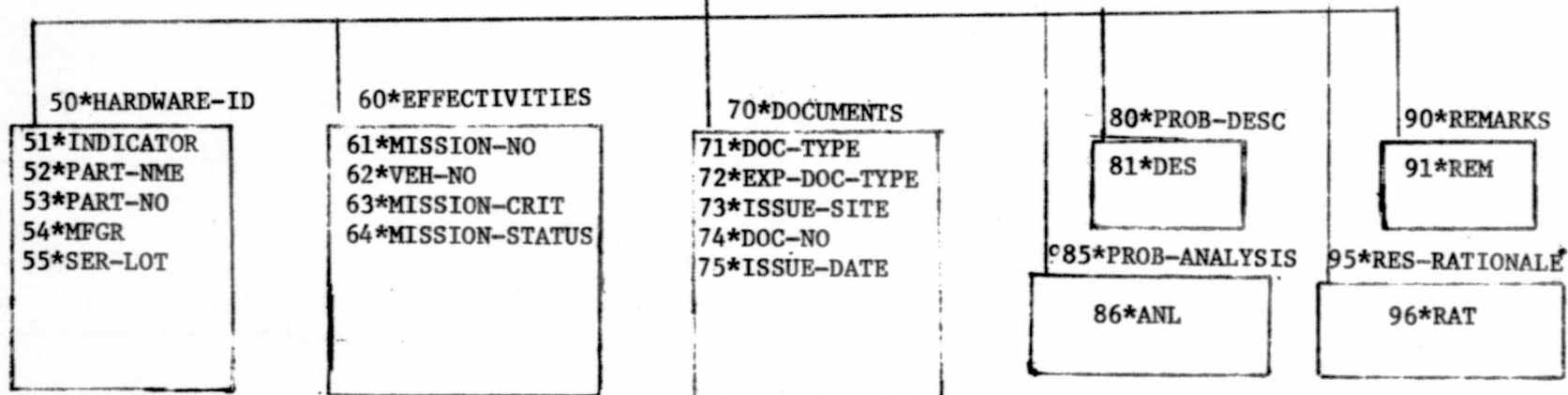
O\*ENTRY

Level  
0

1*PROJECT	11*TYPE	21*INIT-SUBS	31*EST-RES-DATE
2*EXP-PROJECT	12*REF-NO	22*DATE-REC	32*PREV-COND
3*ACT-ASSIGNEE	13*VEH-ON	23*CAUSE	33*EXP-PREV-COND
4*PRINT-FLAG	14*CRIT	24*EXP-CAUSE	34*ACT-RES-DATE
5*CNTR	15*WORK-UNIT	25*PAE-REVIEW	35*TIME-CYC
6*SUBCNTR	16*LOC	26*DATE-UPD	36*HDW-DISP
7*SUBSYSTEM	17*SUS-VER	27*FL-MODE	37*EXP-HDW-DISP
8*LEVEL	18*OCC-DATE	28*EXP-FL-MODE	38*TEST-DOC-NO
9*REPORT-NO	19*TEST-OPER	29*COND-MATL	39*CONSTRAINT
10*STATUS	20*EXP-TEST-OPER	30*EXP-COND-MATL	

2-14

Level  
1



PDS PROBLEM DATA BASE STRUCTURE

Figure 2-5

0\*ENTRY

Level  
0

901\*NAME  
902\*REF  
903\*PDS-NO  
904\*REVISION-DATE

905\*ENTRIES

Level  
1

906\*EXP-CODE  
907\*STA-ABB  
908\*DEFINITION  
908\*OTHER-INFO

PDS TABLE DATA BASE STRUCTURE

Figure 2-6

0\*ENTRY

Level  
0

951\*PASSWOR  
952\*USERID  
953\*GROUP  
954\*CNTR  
955\*SUBCNTR  
956\*REVISION-DATE

PDS SECURITY DATA BASE STRUCTURE

Figure 2-7



### 3.0 INTERACTIVE PROCESSING SYSTEM

The establishment of the transaction oriented link between a user and PDS requires the execution of certain unique transactions. The following transactions are initiated by PDS whenever a user requests access to the system or finishes his job session.

- Sign-On
- Processing request (establishes control mode for interactive processing)
- Sign-Off

The functions performed by these transactions are:

- User Identification (Sign-On)
- User Control Mode (Command)
- User Termination (Sign-Off)

These transactions are discussed in detail in sections 3.13, 3.14, and 3.15 respectively.

The transaction interactions required to satisfy an interactive processing request are described in Sections 3.1 through 3.12.

Function keys on the JSC MOPS terminals will be used to select the transaction the user wishes to process. The function key will indicate the user's control mode.

The PDS DRD paragraph number that each section addresses is listed in parenthesis after the section name.

The Interactive Processing System is illustrated in figure 2.2.

### 3.1 PROBLEM DISPLAY (2.3.1, 2.3.2)

Function: To provide the user with the capability to display all the element values for a particular problem described in section 2.1 of the PDS DRD. The Problem Display constitutes a single problem data report. The element may be displayed in either Standard Abbreviation or Express Code format.

The Problem Description, Remarks, Analysis, and Resolution text fields will only use as many lines as necessary to display the data they contain. The Remarks text will be displayed after Problem Description if the complete text will fit on page 1, otherwise Remarks will be displayed on page 2. Similarly, the Resolution text field will be displayed after Analysis if the complete text will fit on page 2, otherwise, the Resolution text field will be displayed on page 3. A Continue or paging command will be provided to allow the user to direct display of the second and third pages. Listed below are the two displays with their associated function key that support the above function.

- Standard Problem Display - 01
- Express Problem Display - 08

These transactions will consist of the tasks listed below.

- Input
- Read Data Base
- Security
- Write Terminal

Each task must provide the linkage through the TLP to the next task to be executed, with the last task in the sequence returning to the Command transaction.

Figure 3-1 illustrates the flow of the transaction.

### 3.2 PROBLEM ADD (2.5.2.1)

Function: To provide the user with the capability of entering the element values of a new problem in the problem data base. After transmission the input data will be edited in accordance with the security checks outlined in section 2.4 (DRD) and the data edits outlined in section 2.1 (DRD). All errors will be displayed and the originator will have the opportunity to make corrections. Assuming page 1 is accepted, the originator may then continue to input data on page 2 and page 3, transmitting each page and making corrections as required sequentially; or he may enter another new problem if no data exists for pages 2 and 3. The data may be entered in either Standard Abbreviation or Express Code format. The transactions that provide this capability and their associated function keys are listed below.

- Standard Problem Add-Page 1 - 02
- Standard Problem Add-Page 2 - 03
- Standard Problem Add-Page 3 - 04

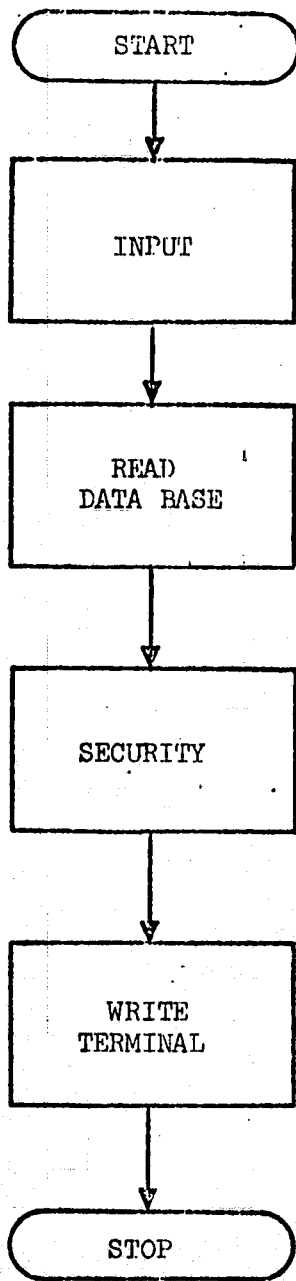


Figure 3-1 Problem Display

- Express Problem Add-Page 1 - 09
- Express Problem Add-Page 2 - 10
- Express Problem Add-Page 3 - 11

These transactions will consist of the tasks listed below.

- Input
- Read Data Base
- Security
- Write Terminal
- Read Terminal
- Validation
- Write Data Base

Each task must provide the linkage through the TLP to the next task to be executed. The Command transaction will be called at the termination of the transaction.

Figure 3-2 illustrates the flow of the transactions.

### 3.3 PROBLEM UPDATE (2.5.2.2)

**Function:** To provide the user with the capability of changing the element values stored in the problem data base. The JSC Problem Display, including all current element values for the requested problem, will be displayed. The user may then proceed to change values in accordance with the authorities discussed in section 2.4 (DRD), transmitting the entire page of data. The software will determine the changes made and edit all new data in accordance with the data element edits outlined in section 2.1 (DRD). The data

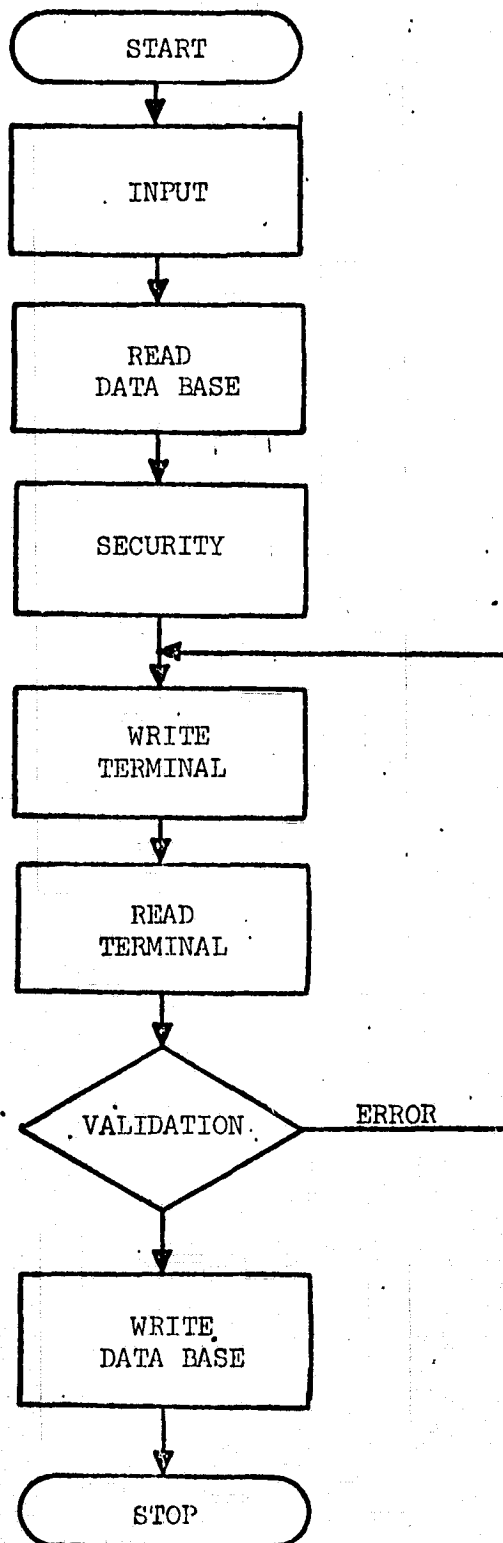


Figure 3-2 Problem Add

may be updated in either Standard Abbreviation or Express Code format. The transactions and their associated function key that provide this capability are listed below.

- Standard Problem Update-Page 1 - 05
- Standard Problem Update-Page 2 - 06
- Standard Problem Update-Page 3 - 07
- Express Problem Update-Page 1 - 12
- Express Problem Update-Page 2 - 13
- Express Problem Update-Page 3 - 14

Each transaction will consist of the tasks below.

- Input
- Read Data Base
- Security
- Write Terminal
- Read Terminal
- Validation
- Write Data Base

Each task will provide the linkage through the TLP to the next task to be executed. The Command transaction will receive control at the end of the transaction.

Figure 3-3 illustrates the flow of the transactions.

#### 3.4 CODE LIST DISPLAY (2.3.3)

**Function:** To provide the user with the capability to display the code tables stored in the current Tables Data Base. The user may display a desired code table in two

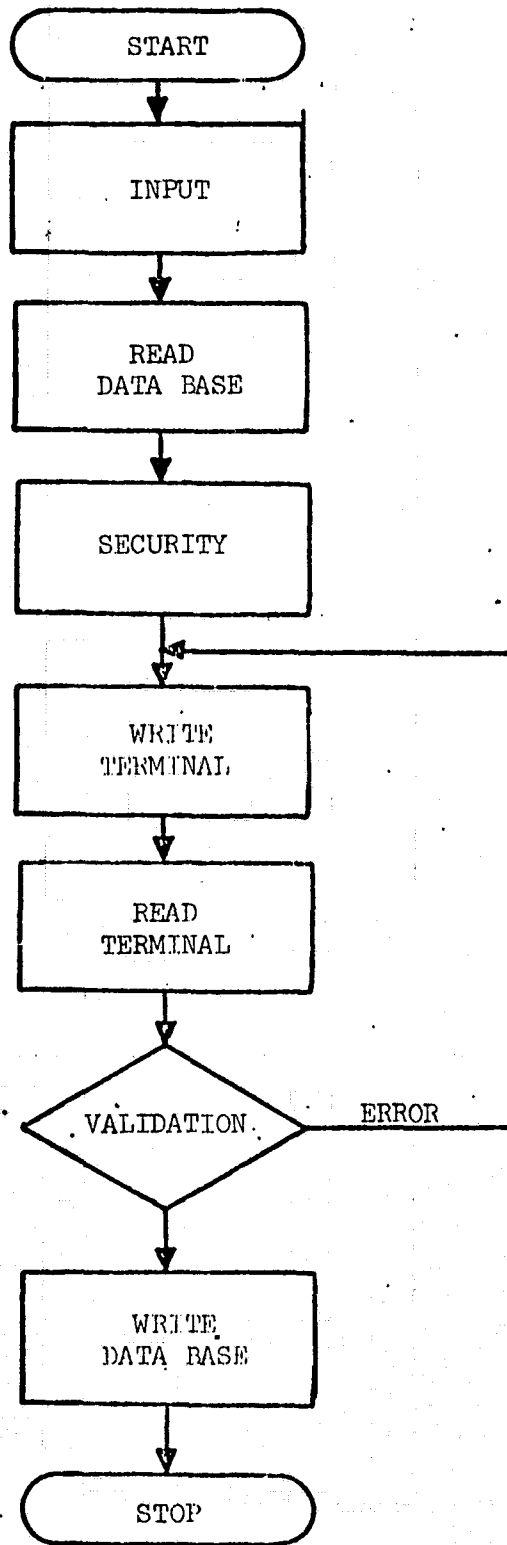


Figure 3-3 Problem Update



ways. First, he can request that the entire code list for any given table sorted by designated parameter in ascending order be displayed. Or he may enter the Express code or the Standard Abbreviation Code and have the element definition, Standard Abbreviation Code, Express Code, and the other-info fields displayed. Two transactions are required to provide this capability. They are listed below with their associated function key.

- Code List Table Display - 15
- Code List Element Display - 16

Each task will provide the linkage through the TLP to the next task to be executed. The Command transaction will receive control at the end of the transaction.

Figure 3-4 illustrates the flow of the transactions.

### 3.5 CODE LIST UPDATES (2.3.3)

Function: To provide the user (PAE) with the capability to update code list entries. Code list changes will be applied to the Tables Data Base at the time of entry, but will not be used until the following day for validation. However, adds will be used for data validation upon entry. A batch program will be required to search the Problem Data Base each night to update elements effected by the code list changes entered for that day. Two transactions are needed to provide the above capability. They are listed below with their associated function key.

Code List Element Add - 17

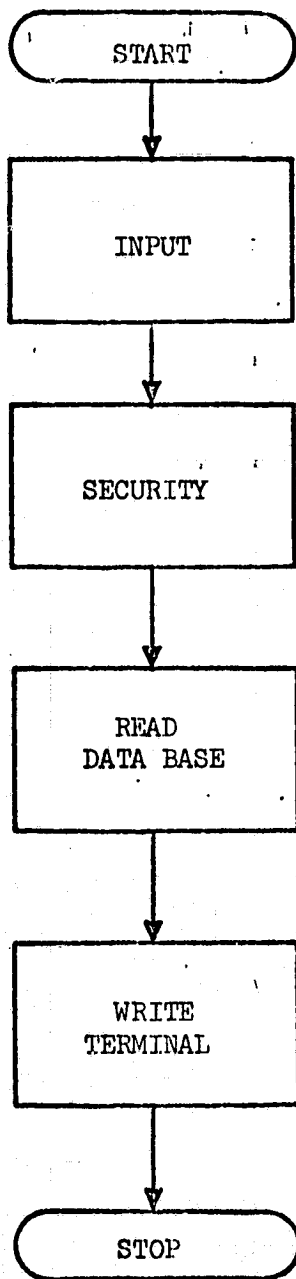


Figure 3-4 Code List Display

## Code List Element Update - 18

These transactions will consist of the following tasks.

- Input
- Security
- Read Data Base
- Write Terminal
- Read Terminal
- Write Data Base

Input will receive control when these transactions are requested. Input will pass control through the TLP to the next task in sequence of task. Similarly, each task will pass control to the next until the end when Write Data Base will pass control back to the Command transaction.

Figure 3-5 illustrates the flow of these transactions.

### 3.6 ABBREVIATED PROBLEM DISPLAY (2.3.4)

Function: To provide the user with the capability to display the values for six significant elements for any Project-Problem Report number requested. The six elements displayed are Subsystem, Level, Cause, Action Assignee, Date/Updated, and Actual Resolution Date. Project, Level, and Cause codes will be displayed in Standard Abbreviation. This transaction (function key 19) consists of the following tasks.

- Input
- Read Data Base

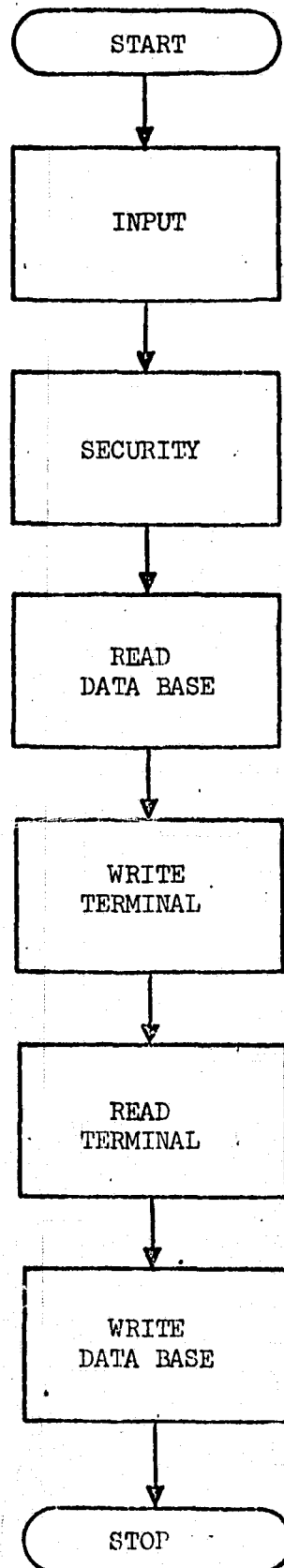


Figure 3-5 Code List Update

- Security
- Write Terminal

The tasks are executed in the above sequence with the control being passed through the TLP.

Figure 3-6 illustrates the flow of this transaction.

### 3.7 ELEMENT DISPLAY (2.3.5)

Function: To provide the user with the capability to display exactly what value has been entered and stored in the data base for an element. The user must enter the Project, Problem Report Number, and the specific element name. The element will be displayed in both code and standard abbreviation value. This transaction (function key 20) consists of the tasks below.

- Input
- Read Data Base
- Security
- Write Terminal

The tasks are executed in the above sequence with control linkage being passed through the TLP.

Figure 3-7 illustrates the flow of the transaction.

### 3.8 ELEMENT UPDATE (2.5.2.2)

Function: To provide the user with the capability to change the value stored in the data base for an element.

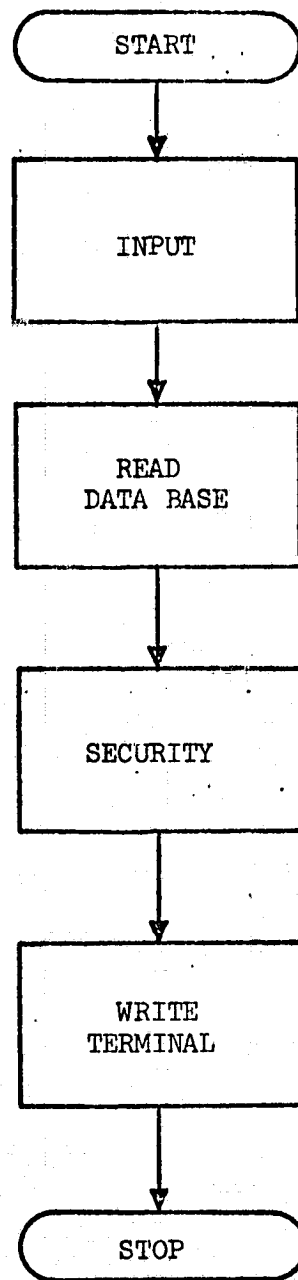


Figure 3-6 Abbreviated Problem Display

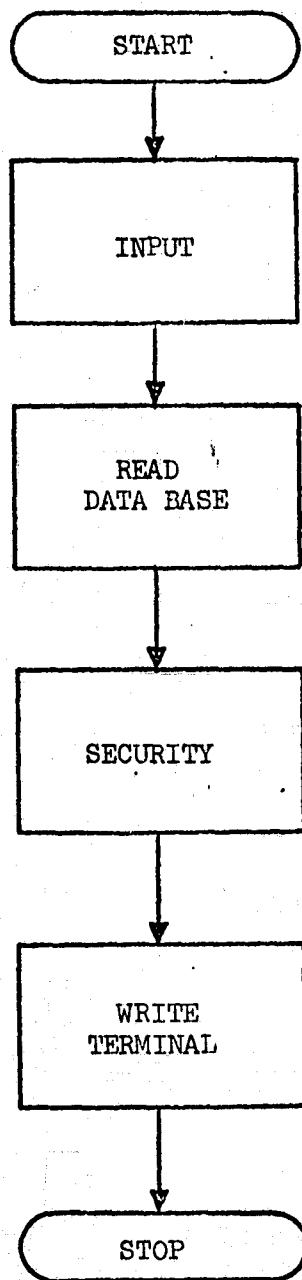


Figure 3-7 Element Display

The user will input the Problem Number, Project, element name, and new element value. The same security and edits checks will be performed as described in section 3.3 of this document. This transaction (function key 21) consists of the tasks below.

- Input
- Read Data Base
- Security
- Write Terminal
- Read Terminal
- Validation
- Write Data Base

The tasks are executed in the above sequence with control linkage being passed through the TLP.

Figure 3-8 illustrates the flow of this transaction.

### 3.9 GROUP DISPLAYS (2.3.6)

Function: To provide the user with the capability of displaying Problem Data base element values from each of the major information groups as defined in the DRD for the JSC, Shuttle Problem Display. No updates will be allowed from this display. The element may be displayed in either the Standard Abbreviation or Express code format. The group to be displayed is identified by a function key request. Listed below are the displays and the associated function key.



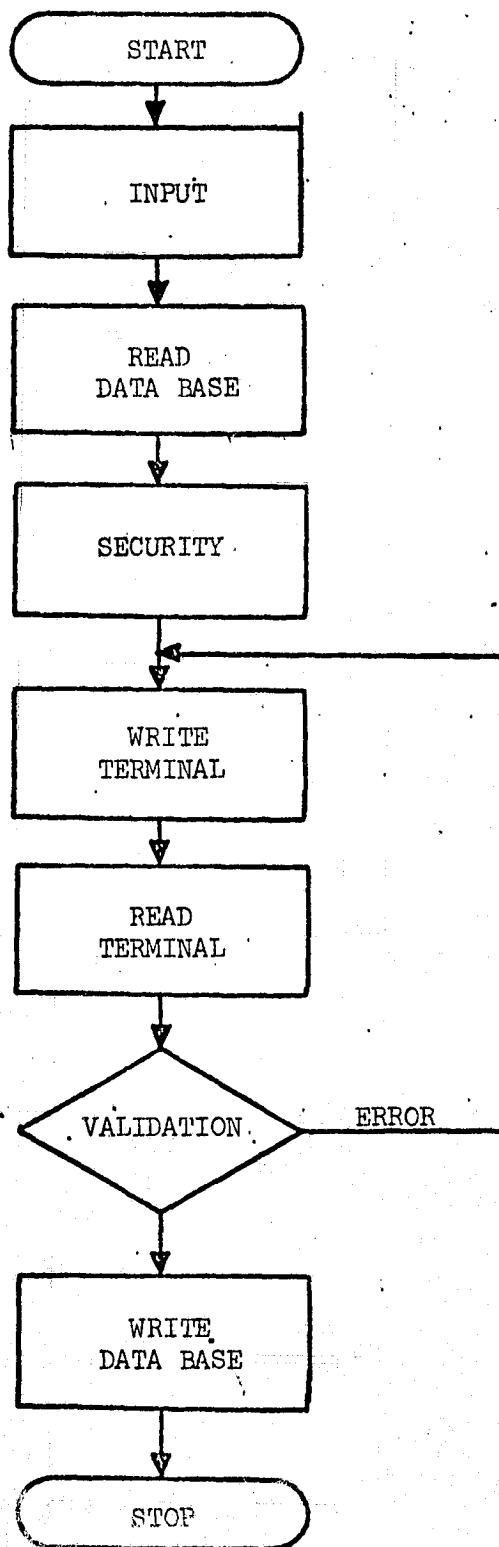


Figure 3-8 Element Update

- Standard Problem Identification - 22
- Express Problem Identification - 23
- Hardware Identification - 24
- Problem Effectivity - 25
- Problem Description - 26
- Standard Pertinent Document - 27
- Express Pertinent Document - 28
- Remarks Division - 29
- Analysis Division - 30
- Resolution Division - 31

The user must also identify the project code and problem report number.

The above ten transactions will consist of four tasks each:

- Input
- Read Data Base
- Security
- Write Terminal

Each task must provide the linkage through the TLP to the next task to be executed, with the last task in the sequence returning to the Command transaction.

Figure 3-9 illustrates the flow of the transactions.

### 3.10 ONLINE DISPLAYS (2.3.7)

**Function:** To provide the user with the capability to retrieve, sort and display data by making direct queries on

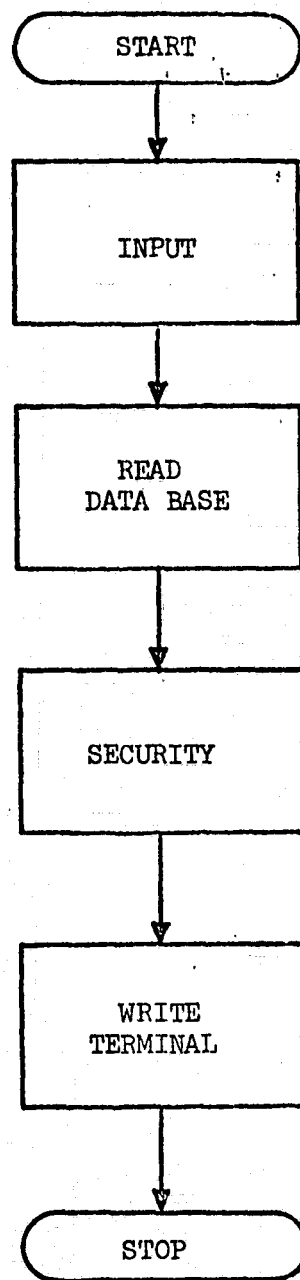


Figure 3-9 Group Displays

the data stored in the Problem Data Base. Multiple occurrences of a data value can be located by searching selected data fields for a specific data value. Or, unique occurrences can be identified by the use of the Boolean operator 'and'.

Element values will be converted to Standard Abbreviations where possible. The following Online Displays have been identified for PDS. The function key to initiate processing is included by the name of the display.

- PAE Problem Review - 32
- Open Problem Summary - 33
- Subsystem Problem - 34
- Action Assignee-Open - 35
- Action Assignee-Resolved - 36
- Part Number Searches - 37
- Part Name Indices - 38

The above seven transactions will consist of three tasks each:

- Input
- Read Data Base
- Write Terminal

The input task is designed to call, after it completes its function, the Read data base task which subsequently calls write terminal. The write terminal task will return control to the Command transaction. The above linkage is accomplished through the Task Link Processor.

Figure 3-10 illustrates the flow of the transactions.

### 3.11 PROBLEM DELETE (2.5.2.1)

Function: To provide the user with the capability to delete a problem that has not been verified. Verified problems cannot be deleted. This transaction consists of the following tasks.

- Input
- Read Data Base
- Security
- Write Data Base

This transaction is initiated by function key number 39.

Each task must determine which task is to be executed next in the task sequence through the TLP.

Figure 3-11 illustrates the flow of the transaction.

### 3.12 SECURITY TRANSACTIONS (2.4)

Function: To provide PAE with the capability to control and assign a user ID and password for each PDS user. This includes the capability to change the range of a user's access to problems entered in the Problem Data Base. The transactions and their associated function keys are listed below.

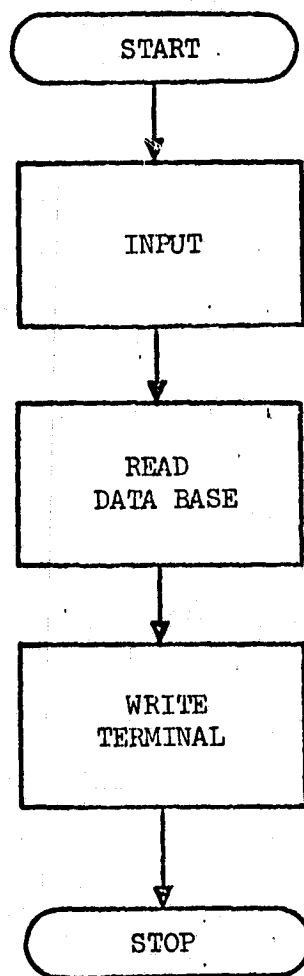


Figure 3-10 Online Displays

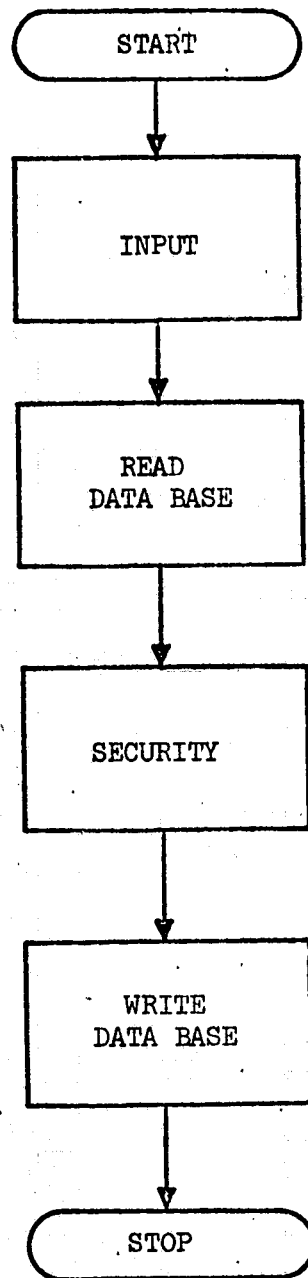


Figure 3-11 Problem Delete

- Problem Reassignment - 40
- Add Password - 41
- Change Password - 42
- Delete Password - 43

The above transactions require the following tasks for execution.

- Input
- Read Data Base
- Security
- Write Data Base

Each task must determine which task is to be executed next in the task sequence through the TLP.

Figure 3-12 illustrates the flow of the transactions.

### 3.13 SIGN-ON

Function: To provide PDS with the capability of determining if the user requesting PDS is a valid user. This transaction uses the Security data base for this validation. Upon validation, the Sign-On transaction automatically transfers the user to the Command transaction. No function key is required for the Sign-On transaction.

### 3.14 SIGN-OFF

Function: To provide PDS with the capability of terminating the user. Involved in this process is the recording of all statistical and logging information



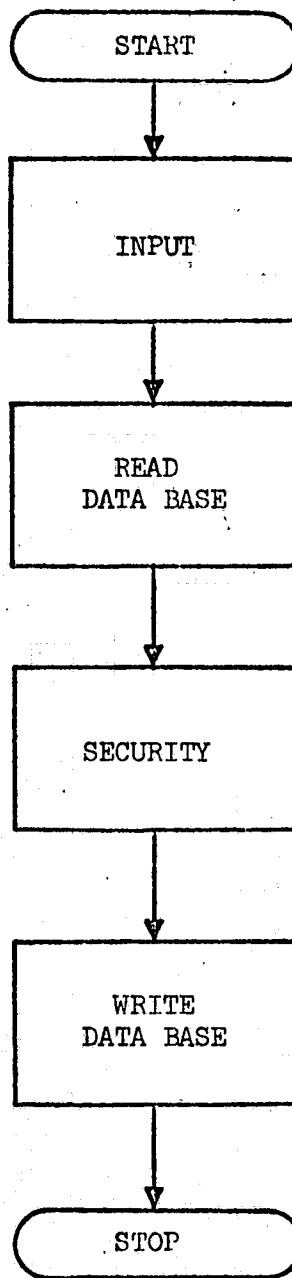


Figure 3-12 Security Transactions

accumulated during execution of PDS. The function key to request this transaction has not been defined at this time.

### 3.15 COMMAND

Function: To provide PDS with the capability of determining which of the requestable transactions the user wishes to execute. It then transfers control to the first task in the sequence of tasks to execute the request.

#### 4.0 BATCH PROCESSING SYSTEM

The Batch Processing System will consist of six programs that produce large volume reports. These programs will generate the reports using PLI/FORTRAN or FORTRAN. The specific reports produced are:

- Open Problem List (OPL)
- Full Problem Report (FPR)
- Interactive Problem Transaction Listing
- Interactive Table Transaction Listing
- Usage Statistics Report
- Code Table Listing

The input required, the processing to be performed for the report, and the output generated by the execution of the programs is outlined in the DRD for PDS. The paragraph number that each program addresses in the PDS DRD is listed in parenthesis after each program title. The Batch Processing System is illustrated in figure 2-3.

##### 4.1 OPEN PROBLEM LIST (2.2.1)

The function of the OPL is to portray for management review the current problem status and other related information of all open problems and those problems which have been resolved since the date of the last OPL. Through user options, print out can be limited to specified projects. Also problems can be selected at the system level only. Program logic will assure that each resolved problem will print once at the element level and once at the system level. The order of printing of problems on the OPL will be

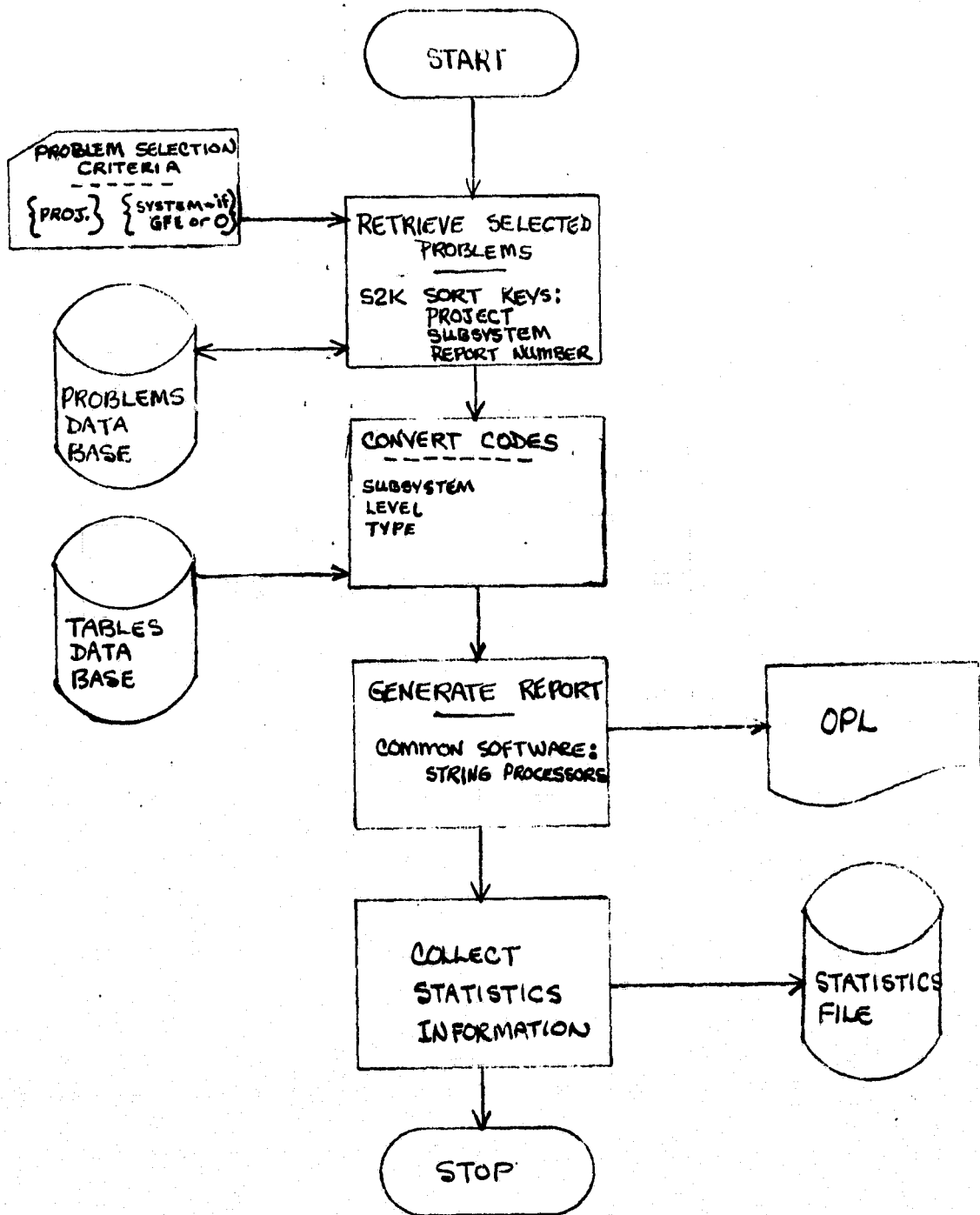
determined by ascending sorts on the PROBLEM REPORT Number within the SUBSYSTEM code within the PROJECT code. At the end of the OPL, an index/tally will be printed. Figure 4-1 illustrates the flow of the Open Problem List program.

#### 4.2 FULL PROBLEM REPORT (2.2.2)

The function of the Full Problem Report is to print a report of all the element values for selected problems in the data base. The user will select the problems to be printed in the FPR by designating a project and subsystem or action assignee and selecting all open problems or all closed problems. The order of printing of problems on the FPR will be determined by ascending sorts on the PROBLEM REPORT Number within the SUBSYSTEM code within the PROJECT code. Figure 4-2 illustrates the flow of the Full Problem Report program.

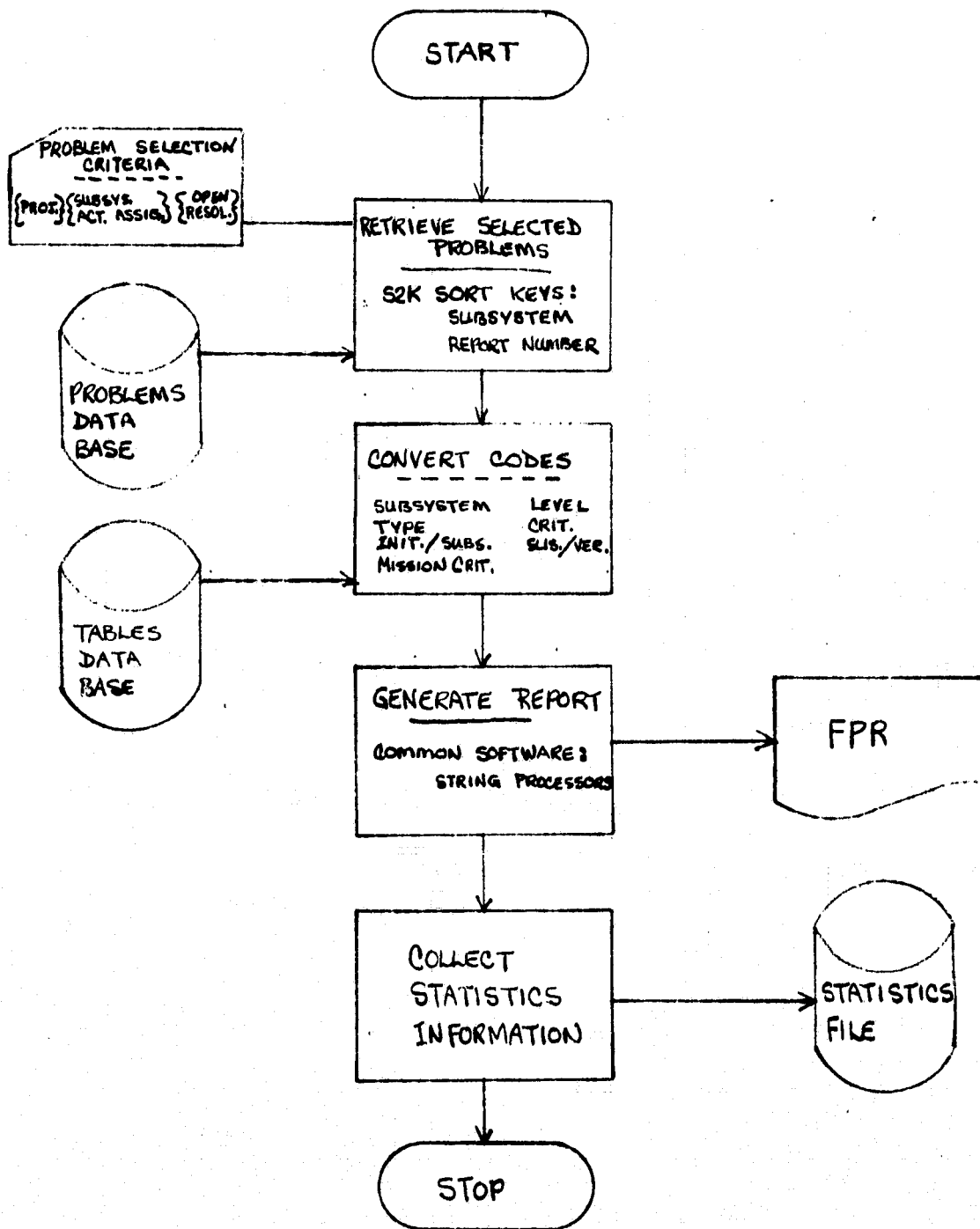
#### 4.3 INTERACTIVE PROBLEM TRANSACTION LISTING (2.2.3)

The function of the Problem Transaction Listing report is for verification and chronological recording of all changes made to PDS data base. All problem transactions recorded that altered the problem data base during the interactive operation for that day will be printed. At the end of the transaction listing, a summary table of the total number of transactions for each user ID will be printed. This report is for the PAE review only. Figure 4-3 illustrates the flow of the Interactive Problem Transaction Listing program.



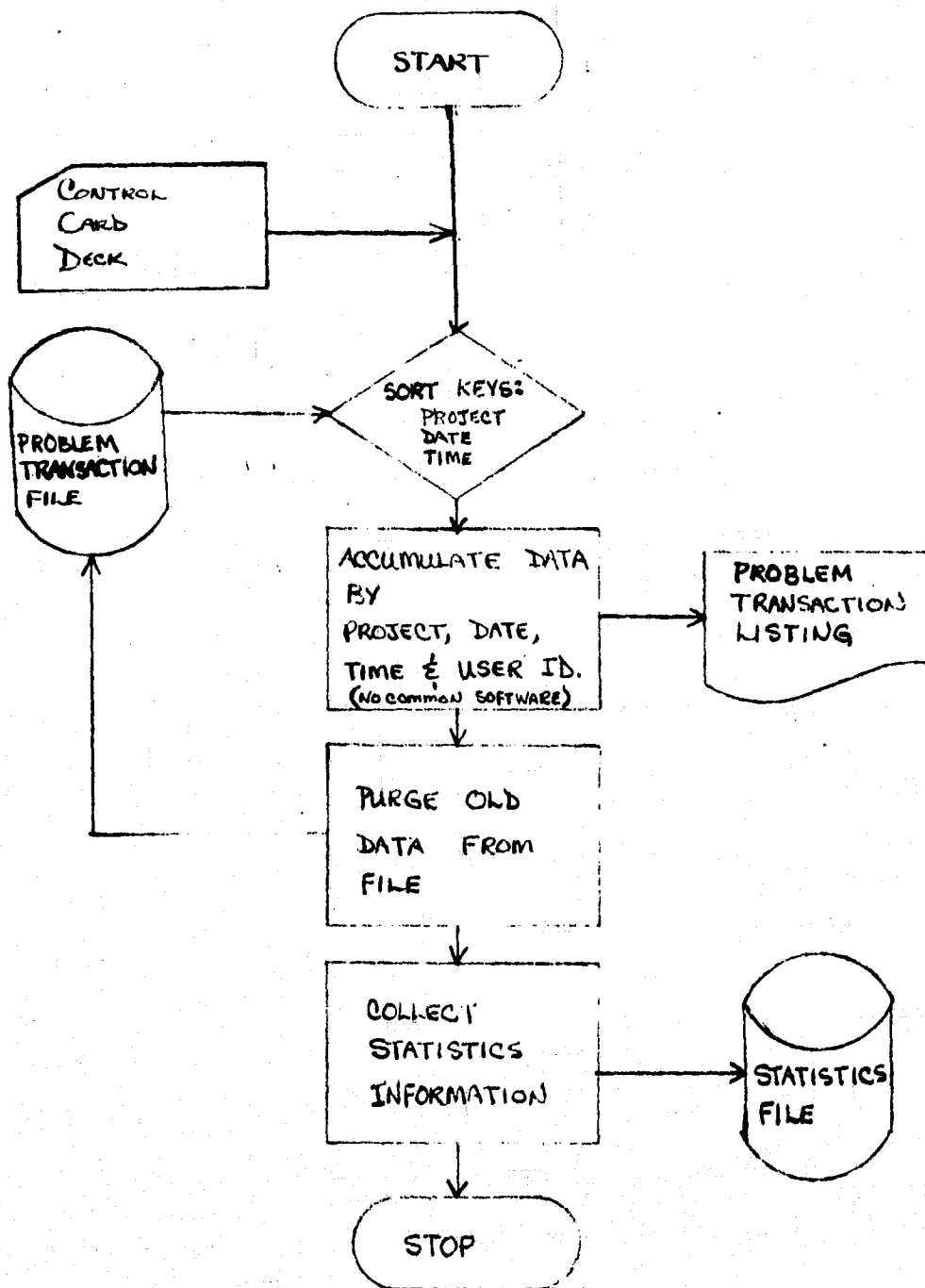
## OPEN PROBLEM LIST

FIGURE 4-1



## FULL PROBLEM REPORT

FIGURE 4-2



## PROBLEM TRANSACTION LISTING

FIGURE 4-3

#### 4.4 INTERACTIVE TABLE TRANSACTION LISTING (2.2.4)

The function of the Interactive Table Transaction Listing report is a chronological recording of all the changes made to the Code Tables by PAE. All table transactions recorded that altered a code table during a one month period will be printed. At the conclusion of the report, a summary of the total number of table transactions will be printed. This report is for the PAE review only. Figure 4-4 illustrates the flow of the Interactive Table Transaction Listing program.

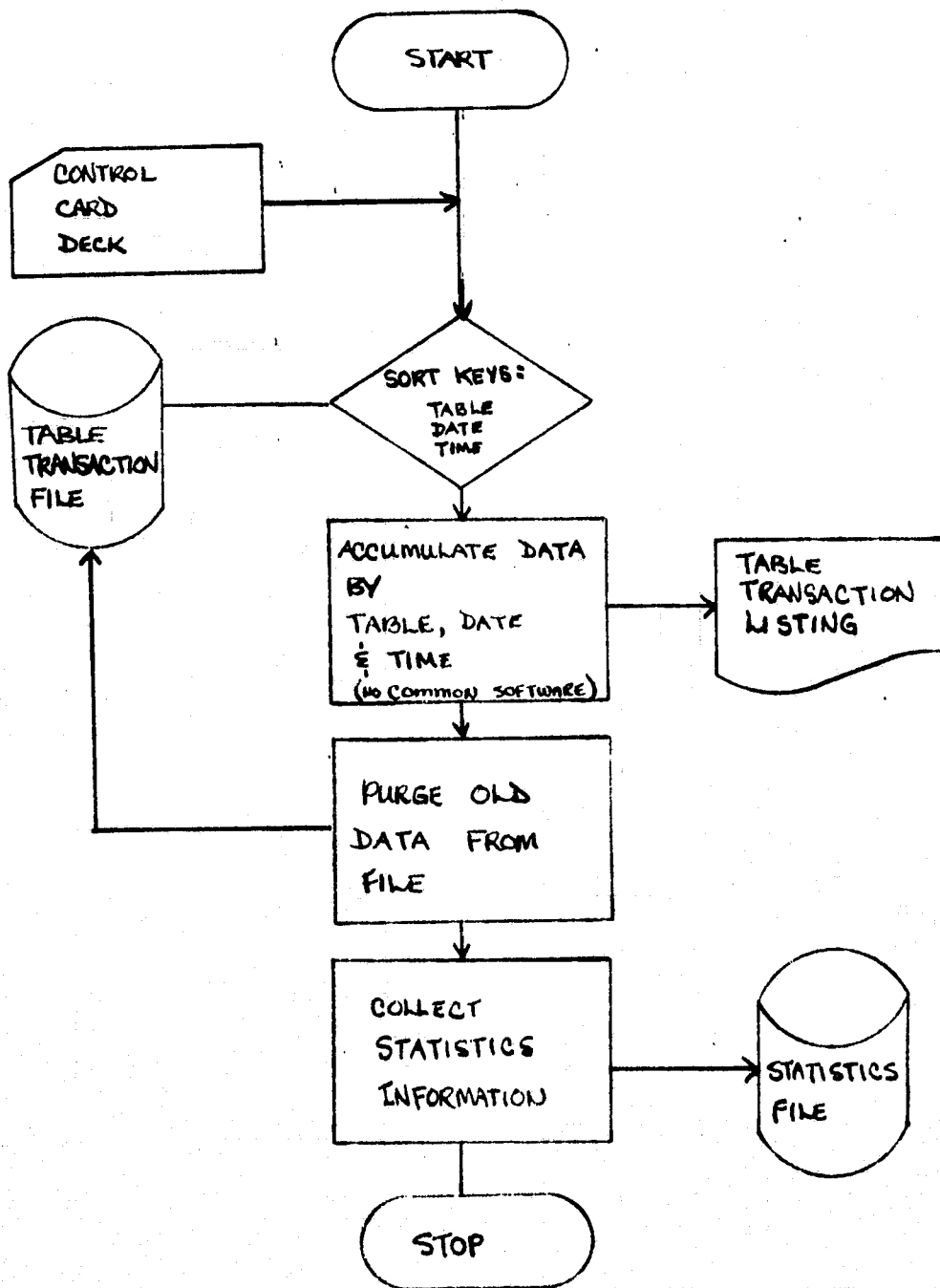
#### 4.5 USAGE STATISTIC REPORT (2.2.5)

The function of the Usage Statistics Report is to optimize system usage and resource availability by listing the computer accounting units used, the number of security violations incurred, and the number of editing errors committed by each user. All usage data recorded during a one month period will be printed. A summary total will be printed at the conclusion of the report. This report is for the Quality Project Engineering review. Figure 4-5 illustrates the flow of the Usage Statistics Report program.

#### 4.6 CODE TABLE LISTING (2.2.6)

The function of the Code List Report is to present either a selected code list or all code lists. The code list data printed will be exactly as entered and stored for each particular list in the table data base. All users may request this report. Figure 4-6 illustrates the flow of the Code Table Listing program.

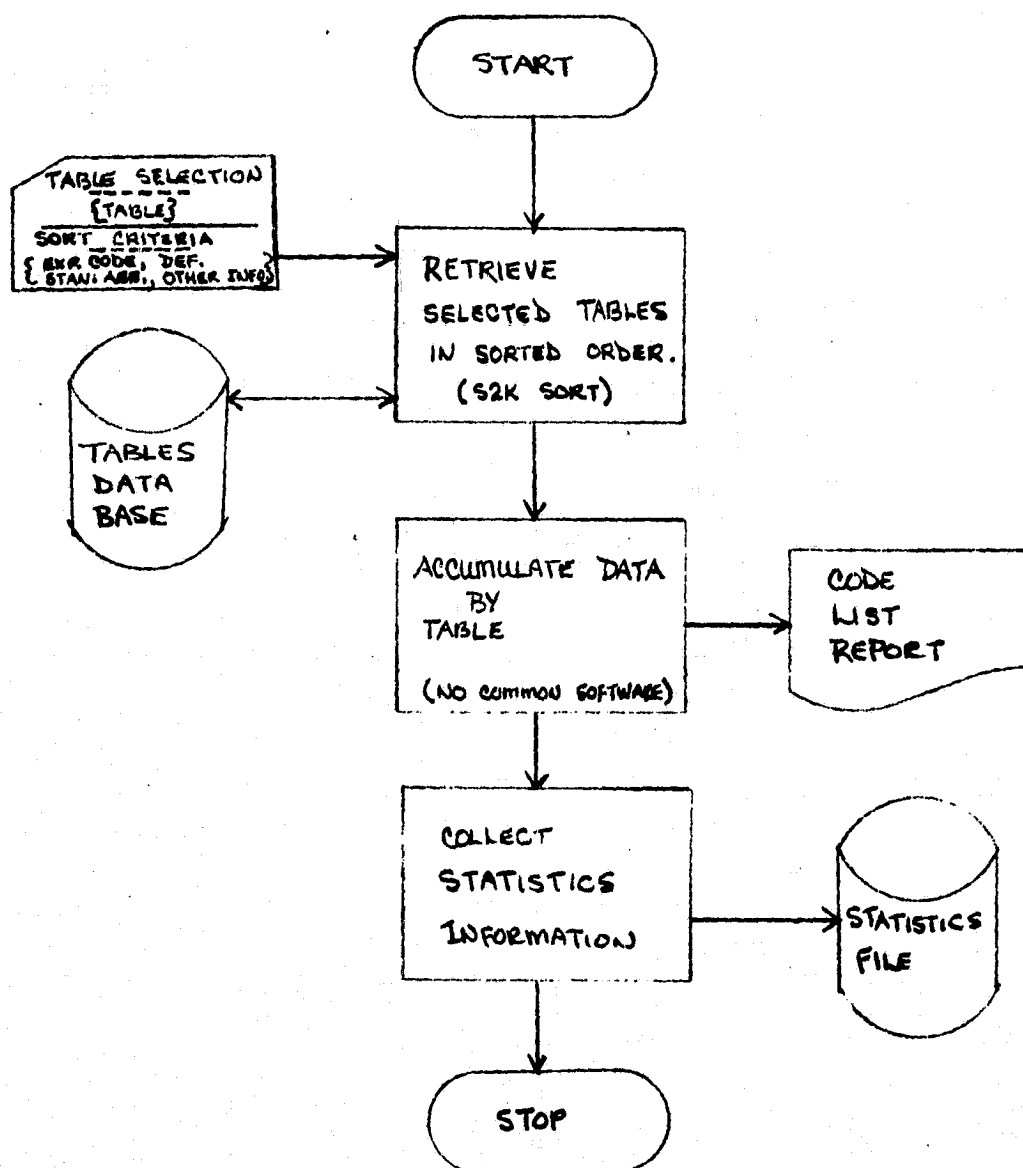




## TABLE TRANSACTION LISTING

FIGURE 4-4





## CODE LIST REPORT

FIGURE 4-6

## 5.0 IMPLEMENTATION

### 5.1 DATA BASE ESTABLISHMENT

Data Base establishment will require two major efforts; the creation of the data base structures and the conversion of the current data in the IPDS data base.

The data base structure for the PDS will utilize the hierarchical structure defined by System 2000. Creation of the data base structures will be accomplished through Define Module concepts now available under the System 2000 data base management system. Figures 2-5 through 2-7 illustrate the data base structures for PDS.

The data for the PDS data bases will consist of the data in the IPDS data base. The implementation effort will include the generation and testing of software to validate and convert the IPDS data base into the format required for loading into the PDS data bases.

The conversion software will consist of a natural language command to unload the IPDS data base in loader string format. Secondly, each entry will then be edited to conform to the PDS specifications for a new problem by a PLI/FORTRAN program. Problems will be rejected if they do not have acceptable values for the Initial Problem Required (IPR) elements. All other elements will retain a null value if the value entered in the IPDS data base is unacceptable. The user will be notified of all errors and the action taken by means of an error report. Also a report of all problems accepted will be generated to inform the user of what will

be in the data base at the initiation of production. This report will be available to the user as soon as the conversion program is running. Finally, the loader string will be reorganized and reformatted into a suitable format which can be loaded into the PDS data bases.